

**10/587851****"PIT FURNACE CLOSING SYSTEM"**

The present Invention Patent of Pit Furnace Closing System, with innovative conception and having important technological and functional improvements, in accordance with the most modern concepts of engineering and in conformity with the required rules and specifications, and which mainly differs from the other lid systems used in the conventional furnaces, so as to provide series of technical advantages, both practical and economical, having its features the novelty fundamental requirements.

The pit furnace consists of, in general, a tubular structure in the internal part of which the parts to be submitted to the high temperature are placed, in suspension and through convenient supports, for the purposes of tempera.

In the conventional system, the parts are always supported or hung in a device having the shape of a basket, or similar to a tree, with a central axis having several beams, being said parts hung in these beams. This basket or tree may be supported in the floor of the furnace.

The state of the current technique is depicted in figure 1, which illustrates, in a schematic manner, a pit furnace of the conventional type, which is formed by a structure (6), which is closed by a lid (7), in which an engine is mounted (8), used for activating the air recirculator (helix) (9), and, the star-like support

basis is mounted inside the furnace structure (10) itself.

In face of the state of the technique described above, the present Invention Patent of Pit Furnace Closing System is being proposed, which will be 5 related with reference to the drawings listed below, in which:

Figure 1 illustrates a schematic view of a pit furnace of the conventional type;

Figure 2 illustrates an also schematic view, however, 10 referring to the proposed pit furnace and its closing system;

Figures from 3 through 18 illustrate views of variants for the device that conditions the part to be worked on inside the pit furnace in reference; and

15 Figures 19, 20, 21, 21A, 22A, 23 and 23A represent variations of complementary lids for closing the pit furnace yet within the scope of this patent.

The conventional pit furnace with lid system, the structure of which is indicated by the 20 reference 6 has a lid 7 that consists of a part similar to a cork, in the due proportions, that is, a lid made of A1020" steel plate with coating of bricks, and the lower plate must be A310" stainless steel, having linked an engine 8 to said lid for driving the helix 9, which is destined to promote 25 the recirculation of the hot air inside the closed furnace.

The conventional pit furnace, as may be verified in figure 1, presents a more complex construction, as well as a more expensive one, further

counting on a star-like support 10, which is mounted on a basis of said support indicated by the numerical reference 11.

In the system belonging to the 5 state of the technique, the parts are always supported or hung in a basket-like device, similar to a tree, with a central axis having several beams, being said parts hung in these beams. This basket or tree may be supported on the floor of the furnace.

10 Also, with regards to the furnace closing system object of this present Invention Patent, a lid itself does not close the pit furnace 1, as in the conventional systems. For closing the pit furnace 1, two beams 2 are used, as well as A304\* stainless steel square 15 iron bars 4 having a diameter of 2 inches, laid across the border of the furnace structure 1 and supported over the beams 2.

Its construction is simple and its cost is very reduced in relation to the conventional 20 furnaces, and its walls have a very reduced thickness in relation to the conventional pit furnace.

The closing means proposed by the present Invention Patent comprise the following: a) pieces of cloth wrap for high temperature are used for 25 closing the furnace 3, cut in a manual way or with the use of a sharp blade; b) a species of box in a stainless steel screen was further developed, folded and having a ring, which is filled in with remains of wraps; c) another form

used is a biparted lid in a thin plate with wraps fixed to it and a cut for the upper part of the supporting device of the parts to pass. This system is restricted so as to contain a single load, on the contrary of the other means, 5 which allow for conditioning several parts in a same furnace.

In the present patent, the supports for the parts to be submitted to the high temperature are "cage"-like devices 5, which are suspended 10 inside the furnace and supported in the two beams 2, not resting on the floor of the furnace, and several are the conditioning systems: a) the very light weighed parts may be fastened with a 3.2 mm wire approximately; b) the medium weighed and heavy parts will follow a table with the 15 drawings of the more evident forms of conditioning; and c) other parts may be hung through welded rings in the parts themselves.

The pit furnace referred to herein has thermopairs, which may be in contact with the 20 part entering into the mouth of the furnace, or may be loosen ones, and their heating ends are located in the central direction of each heating zone (thermopairs bar).

Yet with regards to the conventional system, this one allows protection gas to be 25 used, and the surface is protected and the service may be performed on totally milled parts.

In the system object of the present invention, gas is not used; therefore, it is

indicated to treat raw or previously milled parts; however, the advantages are numberless, mainly since it does not use refractory stainless steel baskets and, therefore, the operating cost is very reduced, generating the single means 5 for making very large parts and very heavy ones, since they are hung in beams 2 external to the furnace 1 and for being not submitted to the heat, they are always cold and always resistant to support weight.

As a variant, a pit furnace is 10 forecast having oil heating and having a rectangular format, which is coated with refractory bricks fixed with stainless steel pins. An end of the pin is welded in the plate of the furnace and the other part is welded in a square plate, which may contain a possible movimentation of the vertical 15 walls of the furnace.

The burners may be fed with diesel oil or with viscous fuel oil. The conditioning of the parts and their being put inside the furnace are similar to the one already described with regards to the tubular pit 20 furnace, as it is further similar to the closing system with cloth wraps for high temperature or with boxes having rings 25 in stainless steel screen, folded, and wraps.

Figure 19, 20, 21, 21A, 22, 22A, 23 and 23A represent variations of complementary lids for closing the pit furnace 1, as proposed.

The objective of the variations presented in the aforementioned figures is that of providing other options of closure through several forms

of complementary lids, with constructive variations that offer the same technical advantages, both practical and functional, of the constructivity depicted in figures from 2 through 18.

5 Figure 19 depicts a variant in  
which the opening between the beams 2 is covered with wraps  
3 and said wraps are supported over square A304" stainless  
steel bars 4, having a diameter of 2 inches.

In figure 20, the fact that  
10 the opening between the beams 2 is closed with stainless  
steel coin screen plates 13 may be appreciated, filled in  
with wraps in flocks. It is observed that the plates touch  
each other when there is no device for supporting the parts  
14, and when there is the device for supporting the parts,  
15 the plates get closer to each other at the maximum point,  
until they touch said device. All of the other openings are  
covered with wrap flocks or pieces of wrap.

Figure 21 depicts the fact that the lids are biparted 15 and touch each other when there is no load, and, when there is load, they touch the supporting device of the parts 14, leaving the device's internal space to be covered with wrap.

Figure 21A depicts a variation of the lid of figure 21. The biparted lids, indicated in this case by reference 15, have a cut 16, which contributes for that there is a perfect mate with the bars of the device for supporting the parts 14.

The lids system of figure 21

is used for occasions in which only one device for supporting the parts will be put into the furnace, while the lid system of figure 21A serves for when the device for supporting the parts 14 have always the same dimensions.

5 Figures 22 and 22A depict lids systems that are used in the situations in which thin and hung parts are put into the furnace without the device for supporting the parts, that is, when the parts are fastened to the ring by means of weld. After the part is removed, it  
10 10 is closed with lids with the same measures of the holes 17.

Figure 23 depicts the fact that the beams 2 may be laid close to the internal diameter of the mouth 18 of the furnace. There will be, in this case, biparted doors 19 with rollers so as to aid with the  
15 15 displacements outwards or inwards. When the doors are closed, the device for supporting the parts 14 must have standard measures and a square plate so as to complete the closure.

Figure 23A depicts the condition of the putting into the furnace being with two devices for supporting the parts, in which a plate 20 that is adapted between the two devices for supporting the parts  
20 20 14 is foreseen.

In the several figures that  
25 25 illustrate the variations of complementary lids for closing the furnace 1, such as proposed, that is, in figures from 19 through 23A, the parts that are laid on the devices for supporting the parts 14 are indicated by reference P.